UNIT 16 HYDROCARBONS

1. The simplest hydrocarbon is:

a) Methane ✓

b) Ethane

c) Propane

d) Ethene

Explanation: Methane (CH_4) is the simplest hydrocarbon, consisting of one carbon and four hydrogen atoms.

2. General formula of alkanes is:

a) CnH2n+2 ✓

b) CnH2n

c) CnH2n-2

d) CnHn

Explanation: Alkanes are saturated hydrocarbons with formula CnH2n+2.

3. Ethene is an example of:

a) Alkane

b) Alkene ✓

c) Alkyne

d) Aromatic compound

Explanation: Ethene (C_2H_4) contains a double bond, so it is an alkene.

4. General formula of alkynes is:

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a) CnH2n+2

b) CnH2n

c) CnH2n-2 ✓

d) CnHn

Explanation: Alkynes contain a triple bond and follow the formula CnH2n-2.

5. The hybridization of carbon in methane is:

a) sp

b) sp^2

c) sp^3 ✓

d) dsp^2

Explanation: In methane, carbon forms four sigma bonds, requiring sp^3 hybridization.

6. The first member of alkyne series is:

a) Methyne

b) Ethyne ✓

c) Propyne

d) Butyne

Explanation: Ethyne (C_2H_2) is the first stable alkyne, commonly known as acetylene.

7. Benzene is classified as:

a) Alkane

b) Alkene

c) Alkyne

d) Aromatic ✓

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Explanation: Benzene (C_6H_6) is an aromatic compound with resonance stabilization.

8. The process of conversion of alkanes to alkenes is called:

a) Cracking ✓

b) Hydrogenation

c) Polymerization

d) Substitution

Explanation: Cracking breaks alkanes into alkenes and smaller molecules.

9. Addition reactions are characteristic of:

a) Alkanes

b) Alkenes ✓

c) Alkynes ✓

d) Aromatics

Explanation: Unsaturated hydrocarbons (alkenes, alkynes) undergo addition reactions due to multiple bonds.

10. Substitution reactions are common in:

a) Alkanes ✓

b) Alkenes

c) Alkynes

d) Aromatics

Explanation: Alkanes undergo free radical substitution reactions like halogenation.

11. Which hydrocarbon is used as fuel gas?

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a) Methane ✓

b) Ethane

c) Benzene

d) Propene

Explanation: Methane is the main component of natural gas used as fuel.

12. Propene has how many double bonds?

a) None

b) One ✓

c) Two

d) Three

Explanation: Propene (C_3H_6) has one double bond.

13. The bond angle in methane is approximately:

a) 90°

b) 109.5° ✓

c) 120°

d) 180°

Explanation: Methane has tetrahedral geometry with 109.5° bond angles.

14. In ethyne, the carbon atoms are:

a) sp^3 hybridized

b) sp^2 hybridized

c) sp hybridized ✓

d) dsp^2 hybridized

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Explanation: Ethyne has a triple bond requiring sp hybridization.

15. A homologous series is a group of compounds that:

a) Differ by CH_2 group ✓

b) Differ by OH group

c) Differ by O atom

d) Differ by N atom

Explanation: Hydrocarbons in a homologous series differ by $–CH_2–$ unit.

16. Which hydrocarbon shows resonance?

a) Ethane

b) Ethene

c) Benzene ✓

d) Ethyne

Explanation: Benzene shows resonance stabilization with delocalized π-electrons.

17. Complete combustion of alkanes produces:

a) CO only

b) CO_2 and H_2O ✓

c) CH_4

d) C_2H_2

Explanation: Alkanes burn completely to form CO_2 and H_2O.

18. Markovnikov's rule applies to addition of:

a) Hydrogen

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b) Halogens

c) HX ✓

d) H_2O only

Explanation: Markovnikov's rule governs the addition of HX to unsymmetrical alkenes.

19. Hydrogenation of alkenes produces:

a) Alkynes

b) Alkanes ✓

c) Aromatics

d) Alcohols

Explanation: Alkenes undergo hydrogenation to form saturated alkanes.

20. Cracking of petroleum produces:

a) Alkanes only

b) Alkenes only

c) Both alkanes and alkenes ✓

d) Aromatics only

Explanation: Cracking produces a mixture of smaller alkanes and alkenes.

21. The common name of ethyne is:

a) Methane

b) Acetylene ✓

c) Ethylene

d) Benzene

Explanation: Ethyne is commonly called acetylene.

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22. Which of the following is not an aliphatic hydrocarbon?

a) Methane

b) Ethane

c) Benzene ✓

d) Propane

Explanation: Benzene is aromatic, not aliphatic.

23. General formula of cycloalkanes is:

a) CnH2n+2

b) CnH2n ✓

c) CnH2n-2

d) CnHn

Explanation: Cycloalkanes follow formula CnH2n due to ring closure.

24. Ethylene is used for:

a) Fuel

b) Ripening of fruits ✓

c) Refrigerant

d) Polymer production only

Explanation: Ethylene gas is a plant hormone used for fruit ripening.

25. Which hydrocarbon undergoes substitution with chlorine in sunlight?

a) Ethane ✓

b) Ethene

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c) Ethyne

d) Benzene

Explanation: Ethane (an alkane) undergoes substitution with Cl_2 in UV light.

26. Which hydrocarbon undergoes substitution with chlorine in sunlight?

a) Ethane ✓

b) Ethene

c) Ethyne

d) Benzene

Explanation: Alkanes (like ethane) undergo free radical substitution with halogens in UV light.

27. Which reaction is used to test unsaturation in hydrocarbons?

a) Baeyer's test ✓

b) Neutralization test

c) Esterification

d) Precipitation

Explanation: Baeyer's test with alkaline $KMnO_4$ detects double/triple bonds by decolorization.

28. Oxy-acetylene flame is produced by burning:

a) Methane in oxygen

b) Ethene in oxygen

c) Ethyne in oxygen ✓

d) Propane in oxygen

Explanation: Ethyne (acetylene) with oxygen gives oxy-acetylene flame used in welding.

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29. The monomer of polyethylene is:

a) Ethyne

b) Ethane

c) Ethene ✓

d) Propene

Explanation: Ethene polymerizes to form polyethylene (polythene).

30. Which alkane is liquid at room temperature?

a) Methane

b) Propane

c) Pentane ✓

d) Ethane

Explanation: Lower alkanes (C_1–C_4) are gases, pentane (C_5H_{12}) is liquid.

31. Isomers of butane are:

a) 2

b) 3

c) 2 ✓

d) 4

Explanation: Butane has two isomers: n-butane and isobutane.

32. What is the IUPAC name of acetylene?

a) Ethyne ✓

b) Ethene

c) Methyne

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d) Propyne

Explanation: Acetylene is systematically called ethyne.

33. Which hydrocarbon is carcinogenic?

a) Methane

b) Benzene ✓

c) Ethane

d) Butane

Explanation: Benzene is a known carcinogenic aromatic hydrocarbon.

34. Which hydrocarbon is the main component of LPG?

a) Methane

b) Butane ✓

c) Propane ✓

d) Benzene

Explanation: Liquefied Petroleum Gas (LPG) consists mainly of propane and butane.

35. Which reaction converts alkynes to alkenes?

a) Oxidation

b) Hydrogenation ✓

c) Substitution

d) Combustion

Explanation: Partial hydrogenation of alkynes produces alkenes.

36. Aromatic compounds obey which rule?

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a) Markovnikov's rule

b) Huckel's rule ✓

c) Avogadro's rule

d) Gay-Lussac's law

Explanation: Aromaticity is explained by Huckel's 4n+2 π-electron rule.

37. Which catalyst is used in hydrogenation of hydrocarbons?

a) Fe

b) Ni ✓

c) Na

d) Zn

Explanation: Nickel (Ni), Pd, or Pt are common hydrogenation catalysts.

38. Octane rating is related to:

a) Diesel

b) Petrol ✓

c) Kerosene

d) LPG

Explanation: Octane number measures anti-knocking property of petrol.

39. The first member of alkane series is:

a) Methane ✓

b) Ethane

c) Propane

d) Butane

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Explanation: Methane (CH_4) is the first alkane.

40. Which hydrocarbon burns with a sooty flame?

a) Methane

b) Ethane

c) Benzene ✓

d) Butane

Explanation: Aromatic hydrocarbons burn with a sooty flame due to incomplete combustion.

41. Which hydrocarbon is called acetylene?

a) Ethane

b) Ethyne ✓

c) Propene

d) Methane

Explanation: Ethyne's common name is acetylene.

42. Which hydrocarbon is used in perfumes?

a) Alkanes

b) Benzene derivatives ✓

c) Ethane

d) Ethyne

Explanation: Aromatic benzene derivatives are used in perfumes.

43. Which gas is obtained by hydrogenation of coal?

a) Methane ✓

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b) Ethane

c) Butane

d) Propane

Explanation: Coal hydrogenation produces methane.

44. Which reaction is characteristic of alkenes?

a) Substitution

b) Addition ✓

c) Neutralization

d) Condensation

Explanation: Alkenes undergo addition reactions due to double bonds.

45. Which hydrocarbon is known as paraffin?

a) Alkanes ✓

b) Alkenes

c) Alkynes

d) Aromatics

Explanation: Alkanes are also called paraffins (little reactivity).

46. How many hydrogen atoms are in butane?

a) 8

b) 10

c) 12 ✓

d) 14

Explanation: Butane (C_4H_{10}) has 10 hydrogens.

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47. Which hydrocarbon is used as anaesthetic?

a) Ethane

b) Cyclopropane ✓

c) Methane

d) Butane

Explanation: Cyclopropane was once used as anaesthetic.

48. Which hydrocarbon is a greenhouse gas?

a) Methane ✓

b) Butane

c) Ethane

d) Propane

Explanation: Methane is a major greenhouse gas.

49. Which is the main source of hydrocarbons?

a) Coal

b) Petroleum ✓

c) Natural gas ✓

d) Water

Explanation: Petroleum and natural gas are main sources of hydrocarbons.

50. Isomers have:

a) Same formula but different structures ✓

b) Same structure but different formula

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c) Different groups entirely

d) None of these

Explanation: Isomers share the same molecular formula but differ in structure.

51.Which hydrocarbon forms acetaldehyde on oxidation?

a) Ethane

b) Ethene ✓

c) Ethyne

d) Benzene

Explanation: Ethene oxidizes to acetaldehyde.

52. Which hydrocarbon is used in making plastic bottles?

a) Ethene ✓

b) Ethyne

c) Benzene

d) Propane

Explanation: Ethene polymerizes to polyethylene (plastic bottles).

53. Which hydrocarbon is used to make styrofoam?

a) Ethene

b) Styrene ✓

c) Benzene

d) Toluene

Explanation: Styrene polymerizes to polystyrene (styrofoam).

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54. Which hydrocarbon is toxic to humans?

a) Methane

b) Ethane

c) Benzene ✓

d) Propane

Explanation: Benzene exposure is toxic and carcinogenic.

55. Which hydrocarbon gives chloroform on halogenation?

a) Methane ✓

b) Ethane

c) Propane

d) Butane

Explanation: Chlorination of methane produces $CHCl_3$ (chloroform).

56. Which hydrocarbon is used in insecticides?

a) Benzene derivatives ✓

b) Ethane

c) Propane

d) Butane

Explanation: Benzene derivatives are used to synthesize insecticides.

57. How many carbon atoms are in decane?

a) 8

b) 9

c) 10 ✓

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d) 11

Explanation: Decane has 10 carbons.

58. Which hydrocarbon is obtained from coal tar?

a) Benzene ✓

b) Methane

c) Propane

d) Ethane

Explanation: Benzene and other aromatics are obtained from coal tar.

59. Which hydrocarbon undergoes polymerization to form PVC?

a) Vinyl chloride ✓

b) Ethane

c) Ethyne

d) Butane

Explanation: Polymerization of vinyl chloride produces PVC.

Which hydrocarbon is called “king of chemicals”?

a) Benzene ✓

b) Ethane

c) Methane

d) Ethyne

Explanation: Benzene is called king of chemicals due to its wide industrial applications.

60. Which is not an alkyne?

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a) Ethyne

b) Propyne

c) Butyne

d) Propene ✓

Explanation: Propene has a double bond, so it is an alkene.

61. Which hydrocarbon has a triple bond?

a) Methane

b) Ethene

c) Ethyne ✓

d) Benzene

Explanation: Ethyne contains a carbon–carbon triple bond.

62. Polymerization of ethyne gives:

a) Polythene

b) Polyacetylene ✓

c) PVC

d) Nylon

Explanation: Ethyne polymerizes to polyacetylene.

63. Which reagent distinguishes between alkanes and alkenes?

a) H_2

b) Br_2 water ✓

c) HCl

d) HNO_3

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Explanation: Alkenes decolorize bromine water while alkanes do not.

64. Cyclohexane is:

a) Alkane ✓

b) Alkene

c) Alkyne

d) Aromatic

Explanation: Cyclohexane (C_6H_{12}) is a saturated cyclic alkane.

65. Which hydrocarbon is known as marsh gas?

a) Ethane

b) Methane ✓

c) Propane

d) Butane

Explanation: Methane is called marsh gas as it is formed in marshes.

66. Which hydrocarbon is also called olefins?

a) Alkanes

b) Alkenes ✓

c) Alkynes

d) Aromatics

Explanation: Alkenes are also called olefins (“oil forming”).

67. Which hydrocarbon is used for welding purposes?

a) Ethane

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b) Ethene

c) Ethyne ✓

d) Propane

Explanation: Ethyne (acetylene) is used in oxy-acetylene welding.

68. Propane has how many hydrogen atoms?

a) 6

b) 8

c) 10 ✓

d) 12

Explanation: Propane (C_3H_8) has 8 hydrogen atoms.

69. In alkynes, the carbon–carbon bond consists of:

a) 1 σ bond only

b) 1 σ and 1 π bond

c) 1 σ and 2 π bonds ✓

d) 3 σ bonds

Explanation: Triple bond = 1 sigma + 2 pi bonds.

70. The number of π bonds in ethene is:

a) 1 ✓

b) 2

c) 3

d) 0

Explanation: Ethene (C_2H_4) has one π bond in its double bond.

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71. Which hydrocarbon is insoluble in water?

a) Methane ✓

b) Ethene

c) Benzene

d) All of these ✓

Explanation: Hydrocarbons are non-polar, hence insoluble in water.

72. Ethyne contains how many σ bonds?

a) 1

b) 2 ✓

c) 3

d) 4

Explanation: Ethyne has 1 sigma bond between carbons and 3 with hydrogens, total = 3 σ, 2 π.

73. Which reaction converts alkene into alcohol?

a) Substitution

b) Hydration ✓

c) Combustion

d) Cracking

Explanation: Addition of water across double bond (hydration) produces alcohol.

74. Toluene is:

a) C_6H_6

b) $C_6H_5CH_3$ ✓

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c) C_6H_5OH

d) $C_6H_5NH_2$

Explanation: Toluene is methyl benzene ($C_6H_5CH_3$).

75. How many isomers of pentane are possible?

a) 2

b) 3 ✓

c) 4

d) 5

Explanation: Pentane has 3 isomers: n-pentane, isopentane, neopentane.

76. Which hydrocarbon is used to manufacture PVC?

a) Ethyne ✓

b) Propene

c) Benzene

d) Methane

Explanation: Ethyne → vinyl chloride → PVC.

77. Naphthalene contains how many rings?

a) 1

b) 2 ✓

c) 3

d) 4

Explanation: Naphthalene has two fused benzene rings.

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78. Which hydrocarbon is found in mothballs?

a) Benzene

b) Naphthalene ✓

c) Propane

d) Toluene

Explanation: Naphthalene is used in mothballs as insect repellent.

79. Which hydrocarbon is used in dry cleaning?

a) Ethane

b) Benzene ✓

c) Propane

d) Ethyne

Explanation: Benzene was traditionally used as a dry-cleaning solvent.

80. General formula of aromatic hydrocarbons is:

a) CnH2n+2

b) CnH2n

c) CnH2n-6 ✓

d) CnH2n-2

Explanation: Aromatics (CnH2n-6) due to ring structure and unsaturation.

81. What is the geometry of ethene?

a) Tetrahedral

b) Linear

c) Trigonal planar ✓

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d) Square planar

Explanation: Carbon atoms in ethene are sp^2 hybridized, trigonal planar.

82. Which is a saturated hydrocarbon?

a) Ethene

b) Ethyne

c) Methane ✓

d) Benzene

Explanation: Methane is fully saturated (no double or triple bonds).

83. Which hydrocarbon produces soot on burning?

a) Aromatic hydrocarbons ✓

b) Alkanes

c) Cycloalkanes

d) Alkenes

Explanation: Aromatics produce soot due to high C:H ratio.

84. The process of converting ethane into ethene is:

a) Dehydrogenation ✓

b) Hydrogenation

c) Substitution

d) Combustion

Explanation: Removal of hydrogen produces ethene.

85. Which hydrocarbon is liquid at room temperature?

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a) Ethane

b) Pentane ✓

c) Methane

d) Propane

Explanation: Pentane is a liquid hydrocarbon at room temperature.

86. Benzene reacts with chlorine in sunlight to give:

a) Chlorobenzene

b) Hexachlorocyclohexane ✓

c) Dichlorobenzene

d) Chloroform

Explanation: Substitution under UV light gives hexachlorocyclohexane (BHC).

87. Which hydrocarbon polymer is used in making synthetic rubber?

a) Isoprene ✓

b) Ethyne

c) Ethane

d) Propane

Explanation: Isoprene polymerizes to natural/synthetic rubber.

88. Which gas is produced by incomplete combustion of hydrocarbons?

a) CO ✓

b) CO_2

c) SO_2

d) NO_2

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Explanation: Incomplete combustion produces carbon monoxide.

89. The bond angle in ethene is:

a) 109.5°

b) 120° ✓

c) 180°

d) 90°

Explanation: sp^2 hybridized carbons in ethene have bond angles of 120°.

90. Which hydrocarbon has no isomer?

a) Methane ✓

b) Butane

c) Pentane

d) Hexane

Explanation: Methane has only one possible structure.

91. Which hydrocarbon is used to make TNT?

a) Benzene ✓

b) Ethane

c) Ethyne

d) Propane

Explanation: Benzene is used to make trinitrotoluene (TNT).

92. Which hydrocarbon undergoes electrophilic substitution?

a) Alkane

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b) Alkene

c) Alkyne

d) Benzene ✓

Explanation: Benzene undergoes electrophilic substitution reactions.

93. Which alkyne is used in carbide lamps?

a) Ethyne ✓

b) Propyne

c) Butyne

d) Hexyne

Explanation: Ethyne from calcium carbide was used in carbide lamps.

94. Which is an aromatic hydrocarbon?

a) Cyclohexane

b) Benzene ✓

c) Ethyne

d) Butane

Explanation: Benzene is aromatic.

95. Which alkane is called natural gas?

a) Methane ✓

b) Propane

c) Butane

d) Ethane

Explanation: Methane is the main component of natural gas.

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96. How many π bonds are present in benzene?

a) 3 ✓

b) 6

c) 2

d) 1

Explanation: Benzene has 3 delocalized π bonds.

97. Which hydrocarbon undergoes free radical halogenation?

a) Alkanes ✓

b) Alkenes

c) Alkynes

d) Aromatics

Explanation: Alkanes undergo free radical substitution halogenation.

98. Which hydrocarbon is used in lighters?

a) Propane

b) Butane ✓

c) Ethane

d) Methane

Explanation: Butane is used in gas lighters.

99. Ethylbenzene on oxidation gives:

a) Benzene

b) Styrene ✓

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c) Toluene

d) Phenol

Explanation: Oxidation converts ethylbenzene to styrene.

100. Which hydrocarbon is produced during anaerobic decomposition?

a) Methane ✓

b) Ethane

c) Ethene

d) Propane

Explanation: Anaerobic decomposition produces methane (biogas).

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